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Mobilizing the Transnational History of Knowledge Flows. COVID-19 and the Politics of Research at the Borders

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ABSTRACT

This paper mobilizes a transnational approach to intervene in the unfolding history of the Covid-19 pandemic, advocating for nationally based, interdependent initiatives that push back against the fragmentation of national responses and, eventually, national protectionism. Focusing on the governance of digital technologies for data sharing, and using two case studies as illustrations, we describe the emergence of transnational realms of scientific and political cooperation, that were structured to foster interdependence, to bypass insular nationalism, and to subvert digital feudalism. By critically reading these case studies through the lens of the transnational flows of knowledge across borders, we exploit the intellectual and political agendas embedded in this historiographic approach.

KEYWORDS

Standards and interoperability; platform capitalism; national sovereignty; Research Data Alliance; StopCovid

Introduction: national fragmentation and transnational responses to a global pandemic

Late in 2019 an unknown and highly infectious variant of the Corona virus was carried by a bat to a live-food market in Wuhan, China, from where it travelled undetected in human hosts across local, national, and international borders. Despite repeated and increasingly urgent warnings by the Director General of the World Health Organization (WHO) – on 30 January 2020, after a visit to China, he confirmed the importance of human-to-human transmission and declared ‘a public health emergency of international concern over the global outbreak of novel coronavirus’ – most governments chose to downplay, or even to deny the significance of the outbreak.¹ When they did get under way, national responses were irregular and incoherent. As the pandemic progressed different countries diverged in their longer-term response and interpretations of safety measures, creating a highly volatile political and public health environment. In North America, it was Canada’s and Mexico’s turn to call for border walls, following the failure of the United States government to contain the virus. In Europe, the re-opening of borders was accompanied by a dramatic clash in Brussels between Northern and Southern states concerning the scope and terms of the financial investment required to address the crisis and, more fundamentally, the meaning and implications of transnational solidarity at such a fundamental turning point.

Scientific efforts to understand its mode of transmission, and to break its circulation began as soon as the novelty of the Sars-CoV-2 virus was evident. In some fields there was an extraordinary degree of collaboration between members of the international research community exploring measures to stop the pandemic. By the end of April more than 200 clinical trials in search of a vaccine, or at least a palliative, had been launched around the world,² resulting in the identification of effective vaccines by November – an unprecedented scientific feat. That being said, while everyone made use of shared resources such as genomic research on the virus, the results of which were circulated online as soon as they were generated, many of the groups working on specific vaccines did so under a cloud of secrecy and in competition with each other. Meanwhile, data sharing in the clinical realm was hampered by lack of adequate infrastructures, as in the attempt to analyze and compare clinical observational studies made between February and May 2020, where it became clear that there was no global agreement nor set of venues where people working on medical frontlines such as general practitioners (GPs) and hospital workers could share their observations. Scientific internationalism was also often sidelined and researchers reverted to nationalistic, inward looking work. This resulted in a chaotic landscape where most (and most crucial) observations were kept locally (e.g. in many cases, they were faxed rather than shared digitally due to local habits and rules). At the same time, many leading researchers in epidemiology and public health found themselves urgently drafted into national government response teams, which made them focus their work primarily at the national level and away from international collaboration. A ‘global’ response fragmented into a patchy archipelago of uncoordinated data collection initiatives in many domains, aggravated by the efforts of the Trump administration, in particular, to secure a vaccine from any promising (Western) R and D lab for exclusive use in the United States. This retreat behind national walls was accompanied by US withdrawal from the WHO on the grounds that it was a puppet of the Beijing regime, further undermining a coordinated global response to the pandemic.

Such tensions between the local and the global are neither novel nor surprising though their specific expression in 2020 deserves close scrutiny. Historians have long documented how pandemics display the fragility of the human-nature balance in the global ecosystem. The overwhelming power of non-human actants to disrupt the course of history on a world scale has inspired a range of popular and scholarly accounts that seek to disentangle the environmental, social and political factors that decimate populations, and that brutally expose structural inequalities in human societies.³ The scale of these disasters can grant so much narrative power to geography and the environment as to render human intervention almost meaningless.⁴ At the other extreme, scientific triumphalism holds out the promise of eradicating disease from the planet altogether.⁵ Situated between such extremes, nationally based studies that navigate between the global, the national and the local are able to provide far more nuanced accounts of the interplay between disease vectors; institutional, scientific, and industrial responses; the material practices of disease eradication among local populations.⁶ Our study is aligned with these approaches in that it takes the nation state and its governance of public health as a key actor, but engages explicitly with the STS literature by situating it as a node in the construction of the ‘knowledge infrastructure’ that has been mobilized to deal with the pandemic.

Paul Edwards defines knowledge infrastructures as ‘robust networks of people, artifacts and institutions that generate, share and maintain specific knowledge about the human and natural worlds’.⁷ Our study probes into the negotiations between research communities, global data management platforms like Apple and Google, different types of international organizations, and national governments to construct a knowledge infrastructure to deal with the pandemic in ways that respect individual freedom, national sovereignty and global equity. We position ourselves, methodologically, and in our case studies, against a fragmentation of national responses to the global pandemic – and the associated lure of techno-nationalist protectionism. We exemplify and advocate the material possibility and political desirability of organizing transnational collaborative research and development efforts that are structured to protect national control over digitally based health policies while also contributing to responsible cross-border knowledge sharing. As we shall illustrate, such knowledge sharing can be explicitly aimed to denationalize data of relevance to health, including medical data from individuals and groups, and manage them on interoperable platforms – while also retaining national accountability for protecting digital and human rights of the data subjects in question, and cultivating a transnational interpretation of the very idea of ‘public good’. Indeed, the state can play a crucial role in developing and implementing safeguards for personal data sharing and incentives towards transnational approaches to public health, which in turn make it possible to disseminate and re-use data across borders.

Transnational history *that follows knowledge as it travels across borders* is a particularly valuable methodological and political tool to facilitate and support this approach to global emergencies.⁸ It is precisely control over information, data and other forms of knowledge that is at the core of current techno-political conflicts between national governments advocating for enhanced transnational and regional cooperation, on the one hand, and global corporate capitalist giants, like Apple and Google, as well as protectionist political regimes (as was exemplified by the Trump administration), on the other. In this paper we document recent efforts to construct a knowledge infrastructure – and a related political and moral economy – that embraces shared standards for national data collection and cross-border appropriation, mobilization and interoperability.

We focus on two case studies. The first describes the confrontation between two data-management apps running on smartphones to trace exposure to the Covid virus. One, adopted by the German government, was promoted by U.S. corporate communication giants Apple and Google. The other (StopCovid) was developed transnationally by the French research ecosystem in collaboration with German partners. These different technopolitical choices are indicative of deep national histories and related imaginaries of the public good that mingle and clash in transnational cooperation, as well as of the power of monopolistic technological platforms such as offered by the Google-Apple-Facebook-Amazon complex (GAFA) to elude governmental control. The second case study concerns the garnering of expertise at record speed on how to handle medical data of crucial significance to the outbreak response, focusing on the efforts made by a bottom-up transnational initiative of the Research Data Alliance (RDA) – the Covid-19 Working Group – between March and June 2020. The collaborative space within which the RDA operated, which evades the narrow constraints dictated by national logics while at the same time drawing key support and expertise from several governments,

emphasizes the opportunities offered by science and technology as vehicles for new forms of translational dialogue and agency.

Reflection on and comparison of these two cases grounds our broader analysis of scientific and technological responses to the Coronavirus pandemic. These efforts involved sustained dialogue between researchers, national governments, technology firms, citizen organizations and international agencies, thus offering a window on the conditions for transnational collaboration in research on Covid-19. Documenting such efforts is a way for historians to contribute to building imagined futures in which relevant actors engage in a collective effort, driven from the bottom-up, to ensure that everyone, including the most vulnerable victims of Covid-19, benefit from the knowledge – and the vaccine – that can contain its spread.

This essay is but a small step towards understanding an event that will no doubt leave a major trace on twenty-first century history along with other global shocks like climate change, and keep historians engaged for decades ahead. We lack the historical perspective that comes with the passage of time, of course. But as demonstrated by broader ongoing efforts within Science & Technology Studies (STS),⁹ we do have some tools and methodologies that help to cast a critical gaze over the knowledge-related claims made by multiple stakeholders in the current crisis, bringing a historically informed perspective on the role of technology and its intersection with evolving political and social landscapes. A transnational history that takes knowledge as its object of analysis can situate itself at the heart of an ongoing struggle for control over the production and sharing/denying of scientific, technological and medical knowledge, and can reimagine the capacity of the nation state, through transnational modes of cooperation and goal setting, to reshape global forces in defense of national/regional sovereignty, human (including digital) rights, and global justice.

This agenda requires making our normative commitments and stakes, including the political implications of our views on the relation between the national, the transnational and the global, explicit and central to our research. We have developed such commitments through the study of transnational history of knowledge flows – a choice of approach that itself reflects our own international heritage and sensitivities, honed through detailed engagement with empirical materials documenting the role of governments, institutions and policies in the development of science and technology. In Krige's case, a long-term engagement with historical scholarship on scientific and technological collaboration in European institutions, and his later studies on how the American state regulated the circulation of science and technology to promote its global political interests, has sensitized him to the centrality of negotiations over knowledge flows at national borders in transnational analyses. For her part, Leonelli draws on historical, social scientific and philosophical research on the development of data-intensive research over the last fifty years, and particularly scientific and policy debates around the shape and implications of digitally mediated modes of scientific communication, which included the study of historical sources and archives as well as participant observation and interviews with key actors (some of which became collaborators, as Leonelli got involved in the development of major data infrastructures and Open Science policies).

France's StopCovid proximity tracing app¹⁰

Early in April 2020 the French Minister of Health and the Secretary of State for Digital Affairs promoted the development of a 'national' proximity tracing app, StopCovid, as a 'response to both a medical and a social urgency: to do all that we can to avoid a resurgence of the epidemic, of new victims, and another lockdown'.¹¹ In line with monitoring plans rolled out by many other governments, the app would be downloaded onto smartphones, connected to a central server, and would alert a user if she or he had spent some time in close proximity to an infected individual in the previous few weeks. French tech was mobilized to develop, test and release a device in collaboration with European partners and with a firm commitment to respect to the utmost the privacy of the user. At about the same time two American giants in the digital realm, Apple and Google announced that they were also developing together a proximity tracing app that could be downloaded on smartphones, but that stored all relevant data on the phones themselves (a 'decentralized' approach), so providing a higher degree of personal security than the 'centralized' French-type version. This new development was widely hailed as a major contribution to public health and to the protection of individual liberties. Some governments, and that in Germany in particular, embraced it enthusiastically.

This move stimulated a widespread debate on the ethical and political implications of 'centralized' vs 'decentralized' proximity tracing apps. For the French state, digital and national sovereignty over the management of a health care crisis was a central plank of a national health system that had well-defined protocols for respecting the personal privacy of medical records. There the 'googlization' of public health was widely viewed as yet another step in the global expansion of neo-liberal, market-driven technological innovations that bypassed national regulatory systems in the name of protecting individual freedom. For the proponents of the Apple and Google app, the sharing of private data with a national government agency posed a dire threat to individual liberty. As one privacy consultant enthused 'the most efficient privacy regulators in the world right now are Apple and Google'.¹² Here then we have a confrontation between a transnational technological project embedded in a national health system and a corporate based technological fix that decouples data collection entirely from the health services that need it, and leaves each potentially infected individual the freedom to choose whether or not she wishes to inform local health authorities of her condition.

StopCovid was developed by a transnational research consortium embedded in the French research ecosystem with public and private partners. Their aim was to build a device that could help bring the pandemic under control at national and regional levels without violating its users' rights to privacy, and that sought to ensure interoperability by exploiting the technical standards, mechanisms and services made available by PEPP-PT (Pan-European Privacy Protecting Proximity Tracing).¹³ The project was led by Bruno Sportisse, the CEO of Inria, the Institut nationale de recherche pour les sciences et technologies. A small group of French and German experts built the technical backbone of the app, called ROBERT (ROBust and privacy-presERving proximity Tracing).¹⁴ Other partners included the National Institute for Health and Medical Research (Inserm), major high-tech corporations like Dassault and Thales, Orange, a global French telecommunications company, and smaller specialized firms (Lunabee studio

for developing apps, Withings specializing in the internet of things and Capgemini, which developed the back-end architecture).

The broader social questions at stake were discussed by a large number of official bodies that watched over the medical, ethical, legal and social aspects of the project as it unfolded. These included the French National Academy of Medicine, the Commission Nationale de L'informatique et des Libertés, a national committee dealing with ethics and informatics, the National Consultative Committee on Human Rights, the European Center for Disease Prevention and Control, and the government's Conseil Scientifique that comprises about 60 experts, mostly in various fields of medicine and public health, and that provided scientific input and advice throughout the pandemic to the government and to the public.¹⁵ The app was tested for three days in mid-May, debated in the French National Assembly and the Senate on 27 May, and made available to the public on 2 June.¹⁶

From the outset StopCovid was conceived in the midst of the pandemic as a strategy to trace infected people after the lockdown was gradually relaxed beginning on 11 May 2020. Reflecting some of the specificities of life in France, it was designed to alert an individual who had spent some 15 minutes in proximity (about 1 meter) to an infected person, typically while using public transport or in a crowded indoor space. The same approach was adopted in Latvia where Ilea Ilves, an adviser to the president on digital policy, explains that they developed an app to 'use smartphones to perform the otherwise arduous and labour-intensive task of contact tracing', so mirroring what 'public health authorities do anyway in the analogue world: manually trace contacts between infected individuals and people with whom they have come into contact'.¹⁷

The StopCovid app was designed to protect individual liberties and privacy as much as possible, compatible within its overall goal of breaking the chain of transmission. Unlike similar apps in some Asian countries including Taiwan and Singapore, it did not use geolocation data, but exploited the Bluetooth installed on the phone to share signals with other users. This was a tracing, not a tracking app. Anyone who downloaded the app was regularly sent batches of fleeting crypto-identifiers to their smartphone. These encrypted data were picked up and temporarily stored in the smartphone of anyone else in 'proximity' who had downloaded the app. If an individual was tested positive she was given a code to upload on her device, that then alerted everyone else carrying a smartphone that had stored her crypto-identifiers, as well as a central data base, that he or she was at risk. The possibly-infected individual thus informed – or rather the smartphone they had with them, as all of this was anonymous – would then be advised as to what steps to take to curb further possible transmission.¹⁸

The transnational structure of the StopCovid collaboration was achieved by combining the skills of a French team called PRIVATICS with those of four German colleagues from AISEC, the Fraunhofer Society's cybersecurity institute. Inrea's Sportisse could not conceal his admiration for the French group that he described as 'the pride of French research in computer science and informatics', and as 'experts in high-level IT concepts (concerning cryptographic protocols and transmission protocols) and with a firm grasp of the relevant ethical and societal issues'.¹⁹ He also emphasized the spirit of collaboration at the European level in the development of shared technical standards developed by PEPP-PT ensuring desired functionality. One typical example: Bluetooth was not devised to accurately estimate the distance between two smartphones. Its efficacy was affected by

an individual's physiology, the position and type of her smartphone, the charge of its battery and so on. Several European teams worked together to create calibration tests to be used in statistical models that corrected these variations. This shared commitment overcame differences of opinion over some technical decisions, and different emphases 'on the issues of digital and technological sovereignty'. Political considerations were interwoven with technical choices, allowing for national apps that used shared components running on technological infrastructures provided by global corporate giants.

The developers of StopCovid stressed that no one was obliged to install the app, that users could choose to disable their Bluetooth when it was installed, that it preserved their anonymity at every step, that it was not a tracking app, like those used for geolocalisation, and that it was not a 'surveillance app'. Sportisse insisted that StopCovid 'has been designed in such a way that NOBODY, not even the government, has access to the list of people diagnosed as positive or to the list of social interactions between people' (his emphasis).²⁰

In April, 2020 Apple and Google announced that they were developing an alternative system – a contact tracing app that enabled owners of Apple and Android phones to communicate with each other. It shared all the features built into StopCovid but one – data was stored and processed on user's phones themselves, rather than being sent to a central server. This 'decentralized' system was heralded as having distinct advantages as regards privacy over 'centralized' systems like that being developed by the French and many other governments. The new entry into the field caused many governments to reassess their technical approaches to contact tracing, with quite a few of them dropping plans for a national app, and opting for the app proposed by Apple and Google.²¹ Notably those included Germany, the original partner for the StopCovid project, as well as the UK, whose government had initially attempted to set up an app explicitly targeted at population surveillance. The British app allowed the government to access and re-purpose personal data on travel, location and health. It was heavily critiqued by data ethics experts²² and the project was eventually abandoned in favor of the Apple/Google alternative.²³

The significance of describing the Apple and Google app as a 'decentralized' system connecting 'independent' users without recourse to a 'central' server was not lost on Sportisse. As he put it, 'the term "centralized" is often used with the deliberate intent of implicitly stigmatizing a state as wanting to survey people'.²⁴ And there can be no doubt that a centralized data base carries undesirable risks with it, notably the accumulation of personal data that has little to do with contact tracing, and of course the risk of state surveillance.²⁵ This is clearly exemplified in the UK case, and by the highly successful Chinese strategy, which includes sourcing the location history of each citizen from major social media providers such as Alipay and WeChat, resulting in a system primed to control citizen mobility and access to medical care.²⁶

The corporate alternative posed its own threats to individual privacy, however. In fact when the app was first announced the French Conseil Scientifique turned the tables, and said that it was the decentralized alternative that did not provide sufficient guarantees regarding the protection of personal privacy and medical data, because ways of hacking into smartphones were freely available on the web.²⁷ It is also interesting that Apple and Google were reported as saying that they would maintain the ability to disable their app on a regional basis 'once the current crisis is over',²⁸ whether or not national

governments saw any need to keep them active. It was not clear why they wanted to keep this option open, but their remark suggested that Apple and Google were exploiting the opportunity provided by a crisis to extend their undoubted expertise in managing 'big data' into the domain of public health, thus gaining access to the huge user base that uploaded the app. Such strategies have been well-documented as part of the business model for so-called platform capitalism instantiated by the GAFA group.²⁹ It is ironic that whereas these champions of individual liberty would not apparently commit to disabling their apps when the pandemic was under control, the French government was legally obliged to switch off StopCovid when it judged that the health crisis was over.

Indeed by denying healthcare workers direct access to information on infected patients in the name of privacy, a 'decentralized' tracking app could actually harm the health of the sick individual and those whom she encountered. Ilea Ilves has stressed that most infected people were willing to take precautionary measures that might be financially or professionally disadvantageous if they were engaged in an informed, non-coercive conversation with a health care specialist.³⁰ Google and Apple's app precluded this option by only allowing third parties access to data on who was potentially infected if the individual herself chose to provide it. This particular interpretation of individual control over privacy came at the cost of undermining efforts by health authorities to break the chain of transmission, and placed all responsibility for managing and preserving one's rights on the shoulders of app users. This mirrored the US approach to healthcare as the responsibility of individuals, but diverged dramatically from European views of the state as responsible guarantor for the common good. As Tamar Sharon points out, it was not a coincidence that the Apple/Google app had been enthusiastically championed in countries like the US and the UK, where the public sector had been shrunk by successive policies to 'roll back' the state in favor of the market.

Both of these firms imposed limits on the power of sovereign states to use apps stored on smartphones to manage the spread of the virus. First, they 'refused to open their technology to governments pushing for centralized data storage [...]'.³¹ What is more they asserted their monopoly by only allowing one app to be validated and owned per country. Certainly the French app could run on a smartphone using Bluetooth – but with reduced efficacy since it was 'backgrounded' when another app or game was being used on the same device, and it was switched off when the phone was in sleep mode.³² 'Do Google or Apple get to tell a democratically elected government or its public health institutions what they may or may not have on an app?' asks Ieva Ilves.³³ For the Conseil Scientifique the answer was evident: 'The French government holds that the protection of the health of the French people is the exclusive role of the State, and not of private international actors'.³⁴

And here is the rub. What was at stake in the battle of the apps was the power of a nation state to define and implement a contact tracing app that was embedded in its national health policies to control the pandemic, that worked effectively on a smartphone, and that was interoperable with the app developed by Apple and Google. The French authorities regarded this as a fundamental question of national digital and political sovereignty. The Commission Supérieure du Numérique et des Postes (the High Commission for Digital and Postal Affairs responsible for electronic and postal communications) was particularly outspoken on this matter. In giving their

input on the plans to develop StopCovid they stated that ‘the dependence of the STOP COVID device on modifications that have to be made to operating systems of certain foreign companies simply reflects the power relationships that have been put in place over several years between nation states and the GAFA in other domains’. Remarking that the new app proposed by Google and Apple that was being adopted by several governments ‘clearly interfered’ with the development of the French device, the High Commission observed that ‘the Secretary of State has made it clear that the French authorities will be intransigent, and will not allow anyone to impose their choices on the management of the public health crisis and the instruments developed for it, and is ready to abandon the development of the application Stop Covid if these conditions are not met’.³⁵ The Conseil Scientifique reinforced this point by describing one of a number of possible scenarios in which the rapid introduction of major technological innovations at a time of emergency could generate irreversible, technology-dependent systemic changes to the public health system that were difficult to control in a context of national and global restructuring.³⁶

As we mentioned above, to the chagrin of the French, late in April the German government announced that it was abandoning the development of a national app using the European protocols defined by PEPP-PT that had been devised by 130 scientists including those in the Fraunhofer Research Institute and the Robert Koch Institute for public health.³⁷ Like the UK before it, Germany would adopt the solution offered by Apple and Google, believing it to be the likeliest to guarantee confidentiality and avoid any semblance of serving as a mass surveillance system. For instance, senior officials in Angela Merkel’s government argued that they preferred a ‘decentralized system’ of data storage limited exclusively to users’ smartphones. ‘Our aim’, they said, ‘is to have an application for tracking available as soon as possible, and one that is widely accepted by the population’. They were evidently impacted by an open letter published shortly before by about 300 university researchers exhorting the government to adopt the Google Apple proposal as it provided more protection for public privacy, the thorn in the side of any centralized project.³⁸

Why were the reassurances and substantive arguments provided by the French research and ethical instances brushed aside? The answer lies in the deep histories of the countries themselves, in ways that we can only skate over here. French governments, since at least the Vth Republic inaugurated by President de Gaulle have frequently defined their national identity and national sovereignty in terms of opposition to what they see as the overbearing power of the United States, be it in Europe or in NATO.³⁹ This undercurrent of mistrust extended to corporate giants like Apple and Google, aggravated by their ‘take-it-or-leave-it’ attitude to the adoption of their app, and amplified by their strategies of ‘fiscal optimization’. As for Germany, one contributor to a forum on surveillance in German history that was stimulated by Edward Snowden’s revelations of the NSA’s (National Security Agency) mass surveillance programs, defined the resistance against state invasions of privacy in these terms: ‘the history of murder, the Holocaust, persecution, surveillance and denunciation in Nazi Germany and that of the Stasi in the GDR inspired the German reaction to the NSA scandal. No more Holocaust, no more state repression, no more Leviathan in the bedroom: “never again!” is the message to be learnt from German history’.⁴⁰

Transnational cooperation in the development of tracing technologies does not only require developing shared standards and protocols to manage data-collection and interpretation. It also requires interoperability between the apps installed on individual users' smartphones. Apple and Google sought to 'impose' interoperability by demanding (initially at least) that they have sole access to each country's user base: no national app could be installed along with theirs.⁴¹ They levered the protection of individual privacy to subvert state-based 'centralized' systems, and to secure access to a potentially vast base of users who uploaded their app onto smartphones. They posed a corporate alternative to transnationally brokered systems whose interoperability was assured by using standards agreed upon collectively by the representatives of European governments. Conflicting national interests – sharpened by the very different histories of the relations between the state and civil society in France and Germany – fragmented the European response to Covid 19 in this domain along national lines. The ability of transnationally brokered, nationally-based tracing technologies to oppose the monopolistic solution offered by Apple and Google was thus thwarted by deep-rooted, and legitimate anxieties over state abuse of private data, along with the preponderance of power in favor of the GAFA. These corporate giants have been able to impose global technological solutions on national governments that are widely embraced by millions of individual users, but that evade regulatory policies that give substance to national sovereignty.

The transnational governance of Covid-19 research data

Situations where agreements on common problems and paths towards technical solutions need to be molded through the prism of conflicting national interests pose a crucial challenge to transnational transactions. In many ways, this is where the true significance and enormous diplomatic potential of such transactions and resulting agreements or rupture are manifested, as nations come to consider and compare the moral, political and infrastructural economy of their response to specific issues. This is also where the invitation to look closely at what happens with knowledge 'at the borders' matters the most. In this section, we consider a case of work at the borders that, contrary to the StopCovid case, is not centered on the resolution of a problem at the national scale, but rather on coordinating the production and management of regional and even institutional-level medical records in order to facilitate their dissemination and comparative analysis at a global – or at least international – scale. This is the technical, social and diplomatic labor invested in standards, venues and guidelines to share data collected by frontline medical staff based in different parts of the world.⁴² Such data include measurements taken by family physicians and general practitioners, who are often tasked with diagnosing coronavirus symptoms and supporting the (often long) recovery of patients, and clinical observations made by hospital workers involved in assisting patients in intensive care units.⁴³

There is no underestimating how crucial the prompt circulation and analysis of such data is to help governments prepare and respond to local conditions. Consider for instance clinical data on the level of oxygen saturation in the blood of Covid patients. Already by early March 2020, reports from China and Italy alerted frontline medics of the importance of measuring oxygen levels in suspected Covid patients. It was noted that many patients who were being hospitalized exhibited surprisingly low levels of oxygen – equivalent to

severe deprivation, or hypoxia, and typically associated with much more severe symptoms than those displayed at the time of hospital admission.⁴⁴ Through analysis of such data, local doctors started to hypothesize that Covid-19 attacked human hosts in ways completely different from known viruses (and certainly from influenza), namely by causing irreparable damage to patients' respiratory system *well before* its symptoms became pronounced enough for those patients to seek hospitalization.⁴⁵ If true, this observation would explain why so many patients were arriving in hospitals too late to avoid invasive interventions and lengthy recovery times – and in fact, far too often, too late to be kept alive at all. The obvious implication of this finding was that early detection of low oxygen levels was crucial to identify patients in need of assistance before they became untreatable – thus saving lives as well as hospital beds and resources. In European countries, this meant seeking the help of family physicians, who are in the best position to regularly monitor the oxygen levels of people within their clinics who exhibit mild symptoms.

This apparently simple solution turned out to be extremely difficult to implement, for a number of reasons. First, the evaluation of these kinds of data was widely viewed as anecdotal, hard to lift from its local context and unreliable because collected outside of controlled conditions. It did not easily fit the evidence requirements of predictive modelling approaches used in infectious disease epidemiology and privileged by many governments including the UK⁴⁶ Second, many GPs did not have relevant equipment and resources to monitor patients in this way. GPs in Italy for instance tended to have at least one thousand patients assigned to them and this meant that during the critical phase of March and April 2020, they had dozens of patients exhibiting Covid symptoms who needed regular checks throughout the day. Measurements were hard to make at a distance, so doctors felt responsible for visiting patients in their own homes, resulting in some physicians falling ill and even dying due to heavy exposure to the virus. Reluctance towards collecting such measurements, understandably, grew. Third, whatever data were collected were not stored and compared beyond the local level. As we pointed out, it was actually hard to share these data across different parts of the territory, or across its borders, since there were no well-established and recognized standards, no obvious venues or infrastructures to be used, and no guidelines for how to handle these sensitive data securely and responsibly in observance of data privacy laws.

As a result, international recognition of hypoxia as a key cause and potential predictor of Covid death only happened towards the end of April 2020, well over two months after doctors in Italy had raised the alarm. Gearing medical systems towards monitoring oxygen levels and detecting possible hypoxia took even longer, with efforts to this aim still ongoing in fall 2020. A digital solution for data collection and sharing that could save doctors from unnecessary home visits and ensure the identification of rapidly deteriorating patients before they entered a terminal stage was highly desirable. In fact one of us worked along with Italian GPs to acquire state funding for an online system to collect and monitor oxygen level data from their patients. Our application and similar others were however sidelined in favor of more investment on tracing technology. This latter effort, as exemplified by our discussion of StopCovid above, was certainly significant and legitimate as a strategy to monitor the spread of the virus among the population; however, it was often disconnected from the use of digital technology to support Covid treatment at the medical frontline, especially in the early phases of the disease.

This example shows the urgency of devising standards, guidelines, technologies and venues for the prompt and responsible discussion of highly local medical findings. Knowledge does not move transnationally by itself. It requires the construction of shared standards and protocols for data collection and sharing, and access to the technological infrastructure to circulate it globally. These in turn require the support and uptake of institutions – whether private or public, and often in affiliation with national governments – in charge of the governance and use of health data. Similar problems beset the sharing of observational data, not from the doctor's office, but from the clinic. Local care settings and the medical frontline are dominated by local rules for the protection of patient privacy and confidentiality, as well as a lack of technologies geared towards enabling the systematic and secure archiving of data in a digital form and interoperable format. The pandemic brought new urgency to the need to direct expertise and investment towards ensuring ethical forms of medical data sharing and re-use, which would align with effective digital systems for data sorting and analysis. This is the goal that a hastily assembled working group of the Research Data Alliance (RDA) set itself in March 2020.

The Research Data Alliance (RDA)

The RDA is a grassroots organization formally launched in 2013 to bring together researchers interested in data management issues, which quickly grew to encompass over 9000 members by the start of 2020.⁴⁷ Given its already large scope, international recognition and inclusivity, the RDA was well-positioned to launch a COVID-19 Working Group. The group was swiftly organized in five sub-committees, each focusing on a different type of data and comprising up to a hundred expert members: the clinical group, the 'omics' group, the epidemiology group, the social sciences group and the community participation group (aimed at ensuring that data garnered by non-scientists, including nurses and social service workers within the medical system, were appropriately collected and considered by the research establishment).⁴⁸ The clinical sub-group was chaired by Anne Cambon-Thomsen, Emeritus Research Director of the French National Research Centre (CNRS) and a highly respected figure internationally, and proceeded swiftly via online meetings (typically at least three per week). Within a little over three months, which included a period of consultation around draft guidelines, the Covid-19 RDA Working Group was able to launch the final version of the RDA COVID-19 Recommendations and Guidelines on transnational data sharing covering clinical data, omics practices, epidemiology and social sciences, and 'complemented by overarching areas focusing on legal and ethical considerations, research software, community participation and indigenous data'.⁴⁹ In addition to the guidelines and in the spirit of providing concrete outputs of immediate help to researchers around the world, the group published a catalogue of resources to inform the guidelines as well as a visualisation tool to facilitate navigation to resources held by different stakeholders – a crucial tool given the swift proliferation of data sources of varying quality in relation to coronavirus. These outputs were by no means a solution to the complex issue of clinical data sharing, but they did constitute an important step towards such a solution, and particularly the formulation of a regulatory, moral and infrastructural context in which such a solution could be developed.

It is important to note why organizations such as the RDA were well-positioned to achieve what well-established supranational and national institutions had not managed to fully deliver. The very purpose of the World Health Organization (WHO) is to make transnational dialogue and agency in relation to health less dependent on the whims of national (and particularly nationalist) politics, and it may therefore be expected that the kind of work performed by the RDA is precisely what the WHO should be carrying out. The WHO mission is however set at a high, top-down level, which makes it difficult for the organization to engage the nitty gritty details of how data coordination can be achieved in everyday data collection across many different fields (not all of which fall under the WHO's traditional remit) and nations. There is no doubt that the WHO has played a pivotal role in garnering, integrating and disseminating evidence pouring in from medical systems around the world, just as required by its institutional mandate. This was made possible by the cooperation of national agencies, which both enabled WHO work but also imposed important constraints on it – for instance when a given country was reluctant to release formal statistics for political reasons or provided highly partial outputs (as in the case of death tolls, where countries such as the UK initially refused to include deaths occurring in care homes, and where there was anyhow great disparity in the percentage of deaths formally certified as related to a Covid-19 infection). Given its direct dependence on the support of nation states, the WHO also found itself in the crucible of complex global politics and strongly opposing nationalistic reactions to the pandemic, culminating in the United States's request to leave the organization – which demanded a time-consuming reaction.

Similarly, well-established national systems for the collection of data from hospitals also played an important role in supporting transnational initiatives for knowledge sharing, yet they were more directly susceptible to changing political winds. The US Centers for Disease Control and Prevention, or CDC, is a good example of an organization with well-established systems and standards for national data collection on virus infections in hospitalized patients, such as the National Healthcare Safety Network which was swiftly mobilized and put to work at the start of the coronavirus pandemic. In July 2020, however, American hospitals were given a federal order to reroute their data to the new data system, HSS Protect Public Data Hub, which was run by a little-known firm in Tennessee.⁵⁰ The reason given for this radical reorganization was the need to coordinate and assemble CDC data with other relevant data coming from different federal agencies, such as the Centers for Medicare and Medicaid Services (CMS) and the Health Resources and Services Administration (HRSA). Over a hundred leading medical organisations however opposed the move, arguing that it constituted an unwarranted challenge to the expertise and authority of the CDC by the federal government, and it heightened the risk of duplication and loss of data significant to the pandemic response: 'The administration's abrupt decision to establish a new data collection procedure that bypasses the CDC as a recipient of data on patients hospitalized with COVID-19 is alarming and will undermine efforts to control the pandemic at a time when COVID-19 cases and hospitalizations are surging across the country'.

Under these politically charged circumstances, the lack of widely accepted norms, standards, platforms and venues for the compilation, analysis and transnational circulation of observational data from the medical frontline was ever more crippling – and the formation of transnational venues where such gaps could be addressed concretely was

ever more significant. Initiatives such as the Covid-19 Working Group of the RDA retained some independence from the political demands attached to established national and international entities. This was partly thanks to their inclusive and bottom-up ethos, which made them recipients for the identification of goals that could be realistically agreed upon and tackled by many researchers around the world; and partly thanks to the temporary nature of their endeavors, which aimed to push specific actions along, including the set-up and implementation of transnational guidelines and technologies, without having to commit to national sponsors at least in the shorter term. These initiatives also involved high-flying scientists from reputable universities, such as Cambon-Thomsen in the RDA case, who were in positions of power and leadership within their own country and thus able to bring the weight and resources of their institutions and national networks into these transnational collaborations. When confronted with hostile governments, as in the case of the Trump administration, these individuals' visibility and influence at the national level could help to temporarily bypass national constraints in favor of transnationally organized knowledge sharing that benefited many countries, not least their own.

Transnational scientific groupings act as a cradle for innovation both scientifically and politically, producing ideas and proposing possible solutions through the consultation of experts from multiple countries and backgrounds.⁵¹ Implementing these solutions in full requires broader uptake and resources, which is where these transnational venues regularly intersect with less ephemeral international institutions that can provide longer-term support for changes within and across national borders, as well as a sounding board for the political, social and scientific visions elaborated as part of the technical proposals. In the case of the Covid-19 Working Group of the RDA, a key established interlocutor was the European Commission, which was consulted at the moment of publication of the recommendations to help support implementation, as well as at the very start of the group to help identify the needs of policy-makers. Many long-standing scientific organizations also provided extensive support and expertise, such as CODATA, the Committee on Data for Science and Technology of the International Council for Science.

Not only does the fast set-up of these ad hoc groups intersect with long-standing national and international institutions at various points: it is also made possible through well-established, decades-long efforts by interested researchers, funders, scholarly societies, publishers and science policy-makers to 'open' research data and publications, and make them available within and across national borders and ownership regimes. Such efforts, which were prominently backed by an Open Science committee of the European Commission established in 2015, had already proven useful in tackling the Ebola and Zika epidemics, enabling at least some of the medical research establishment to collaborate beyond the usual competitive dynamics encouraged by academic and commercial success metrics.⁵² Various national governments, including France, the UK, Australia, Germany and Portugal, made crucial contributions to the development and implementation of Open Science guidelines, including on the significance of Open Data. The launch of the French National Open Science Plan in 2018, for instance, added teeth to the EU arguments for this mode of research, making it part of the French legal system and institutions. Remarkably, the French plan like many others was elaborated in dialogue with the RDA, and explicitly recognized the importance of transnational guidance from such an organization in developing successful national policy.⁵³ Aside from securing the

financial backing of various national funders, such a positioning was crucial to the RDA capacity to effect change within scientific systems largely governed by the nation state, while also making the RDA into a crucial tool for national governments to access global expertise built through transnational knowledge exchange across several local perspectives. Particularly notable was the continuing effort within the RDA to involve diverse members: while the majority of RDA membership was based in the US, Europe and Australia, the percentage of members from other countries steadily increased, with 144 countries represented among its 11,000 members in fall 2020, including substantive participation by civil servants and government delegates. The RDA acted as a global network of expertise linking multiple national actors in a multiplicity of transnational programs dedicated to producing and circulating knowledge understood as a common good, in explicit opposition to both national protectionism and global digital feudalism.⁵⁴

Concluding remarks. The political pertinence of transnationalism

Many years ago Jeff Hughes remarked that ‘historians have always grappled with the present in their dealings with the past [...]’.⁵⁵ Hughes pointed out that whenever we write history we produce a version of the past that aligns it with some readings (readers) and not others. He goes on to cite T.G. Ashplant and Adrian Jones who emphasized that ‘all historiography rests upon acts of choice. No historiography can ever be a neutral enterprise: an enquiry into any aspect of the past necessarily derives from some evaluation in the present. And in the end, or rather in the beginning, all such choices are not simply historiographic but political’.⁵⁶ This is evidently the case when we choose a transnational or global mode of historiography. These ways of writing history emerged in opposition to a nationally-based approach after ‘the fall of the Berlin wall, the crumbling protective ramparts of national capitalism, a boom in container shipping, and the rise of the cosmopolis’.⁵⁷ ‘Bordered imaginations’ were dislodged, and new narratives that highlighted circulation, flow and movement through networks of inter-connection and interdependence moved center-stage.

Transnational histories that take scientific and technological knowledge as their object are particularly important modes of intervention into the ongoing global pandemic. Notwithstanding dire, if sometimes muddled warnings from China and the WHO, in February 2020 most research communities and governments were unprepared for the economic and public health crises that soon befell them. When the extent of the pandemic was grasped it unleashed a multitude of research initiatives around the globe dedicated to understanding the nature of the virus, and containing its spread. Extensive financial and human resources were mobilized to collect and process relevant data. By engaging with some of these initiatives at an historical moment (summer and fall 2020) our analysis of knowledge flows did not ‘open the black box’ of an already achieved techno-political ‘solution’. Rather, it excavated the dynamics of knowledge-in-the-making at different sites of transnational collaboration that were held together by shared material practices of data collection and analysis and framed by agreed goals that gave them meaning.

Our case studies confirm what was already well-known to STS scholars – that transnational scientific and technological collaboration depends crucially upon agreed standards and protocols for the collection and sharing of data across borders, and – we

would add – on the need for co-production and interoperability between different national strategies and their scientific and technological performance. *Prima facie*, it may seem that what we are suggesting through these two cases is to juxtapose a violent imposition of standards by monopolistic corporate actors (as exemplified by the Apple Google tracing app) with a multilateral search for commons by the research community (as exemplified by the RDA COVID-19 guidelines), with a clear implication that the latter is preferable to the former. There is certainly violence involved in the digital sovereignty associated to data governance regimes by corporate actors, as amply documented by scholars working on platform capitalism and its powerful technocratic hold on democratic powers around the world.⁵⁸ In this sense, the StopCovid case is a story of resistance in the face of the particular kind of political and economic control exercised through standards and infrastructures, stressing the role that the nation state can play in exploiting, mediating or countering such power.

And yet, acknowledging the political nature of standardization is not an indictment of its crucial role within research.⁵⁹ Standards are essential to data mobility and to the very idea of data and related research practices as forms of cosmopolitan knowledge commons, whose transnational use can benefit humanity the world over.⁶⁰ Without interoperable software, data formats and data sources, it would be impossible to conduct much of the research on the impact of COVID-19 on human health and societies – with devastating consequences, as demonstrated by the loss of life and livelihoods in countries that did not manage to contain the disease.

What the RDA efforts exemplified, then, was not a rejection of standards, but rather the value of standardization efforts that recognize their own political nature, associated moral economy and social implications. These efforts were thus organized from the get-go in ways that actively engaged political actors and countered attempts to impose one approach over all others. The main goal of the RDA group was to coordinate rather than unify: in other words, to acknowledge and give voice to the diversity of perspectives associated with different choices of standards, including their political, social and cultural groundings, and reach agreement on how such diversity could be reconciled through a set of compatible procedures. At the same time, the very act of coordinating required agreement on a specific understanding of research and related interventions, which is grounded on consultation and open confrontation rather than insularity. What the RDA instantiated was thus a form of consensus-seeking where consensus – and thus the very idea of what may constitute a ‘common’ – consisted primarily of a commitment to ongoing transnational dialogue. In other words, interoperability standards are not viewed as fixed and determined by the adoption of a specific, unique framework (as proposed by Google, whose solution to the problem of standardization is that everybody use their tools). Interoperability is generated through ongoing transnational transactions over how local standards can relate to each other.

This approach to data practices and protocols has a long history and found its most explicit expression in early twentieth-century visions of informational knowledge commons that would indeed extend to all corners of the earth.⁶¹ Its successful implementation tethers each individual researcher and research group to multiple networks through which knowledge of the virus and its behavior moves, making them at once more visible and more accountable to peers and wider publics around the world. At the same time, this increased visibility feeds researchers’ reputations and clout at home, and provides

a bridge for internationally-emerging expertise to be heard and supported at the national level. The RDA group was just one example of the transnational pedagogies being built among scientists, communities and governance institutions that allowed for collaborative, concrete and pragmatic approaches to the production and circulation of knowledge across national borders, with the express ambition to benefit each participating national context. They represented a different imagination of globalization to that forged through the Washington Consensus, relying less on the imposition of an imperial top-down order and more on consultation among different stakeholders with proven competence to tackle the problems at hand. Scientific expertise, and more broadly the ability to combine research know-how with an understanding of the role of science in tackling specific social challenges, was the main ticket for participation. This was continuously mediated by researchers' status and recognition both within their national settings and beyond national borders, which made it a relatively closed space reserved for specific types of expertise. At the same time, organizations like the RDA were explicitly committed to carving out space for transnational learning that was not marred by prior assumptions of 'Northern' hegemony and/or superiority, especially at a moment where the pandemic was exposing the extent to which the Global North was itself highly fragmented, uneven in its administration of resources and expertise, and crippled by widespread gender and racial biases.⁶² Paraphrasing Boaventura de Sousa Santos, the hope underpinning this commitment is to 'build an expanded commons' – indeed, an expanded political and social ethos – 'on the basis of Otherness'⁶³ – and, we add, *to ensure the uptake of such hard-won commons by national governments around the world*. As ongoing debates on the history and evolution of commons demonstrate, this is a highly idealized view of commons that is constantly subject to recalibration and potential instrumentalization depending on changing sociopolitical, technological and economic conditions. The dynamic nature of commons is precisely what makes the cultivation of dialogue between technical and political forces, including the nation state, crucial to the future vitality and effectiveness of this vision.

The combination of expertise emerging through international cooperation and concrete mechanisms for national uptake and contributions is what makes transnational transactions so effective. Far from being a distraction from research, the extensive resources that organizations like the RDA – modelled to an extent on the European Commission – invested into establishing collaborative relations with nation states was integral to their successful contributions to scientific advancements, particularly given the prominent role played by national governments in the governance of research systems. Reading our case studies through the lens of the transnational travel of knowledge *across* borders, and of the negotiated standards and protocols agreed upon *at* borders to secure interoperability, this paper fuses the engagement of the historian with the material practices of people in the front line of the 'war' against the pandemic to project imagined futures that enact a just and equitable response to its devastating effects.

Notes

1. [https://www.who.int/dg/speeches/detail/who-director-general-s-statement-on-ihr-emergency-committee-on-novel-coronavirus-\(2019-ncov\)](https://www.who.int/dg/speeches/detail/who-director-general-s-statement-on-ihr-emergency-committee-on-novel-coronavirus-(2019-ncov))

2. Matt Apuzzo and David D. Kirkpatrick, "Covid-19 Changed How the World Does Science, Together," *New York Times*, 1 April 2020. See also David E. Sanger, David D. Kirkpatrick, Carl Zimmer, Katie Thomas, and Sui-Lee Wee, "Profits and Pride at Stake. The Race for a Vaccine Intensifies," *New York Times*, 2 May 2020.
3. Diamond, *Guns, Germs and Steel*; McNeill, *Plagues and Peoples*; Hays and Hays, *The Burdens of Disease and Human Response in Western History*.
4. Conrad, *What is Global History?* 145.
5. Hays and Hays, *The Burdens of Disease*, chapter 6.
6. Cueto, *Cold War, Deadly Fevers*, is among the best of them.
7. Edwards, *A Vast Machine*. For a recent application see Edwards, "Knowledge Infrastructures for the Anthropocene."
8. Krige, *How Knowledge Moves*; Krige, *Writing Transnational History of Knowledge Flows in a Global World*. The focus on *knowledge as such* distinguishes this approach from others by historians of science and technology, e.g. Kohlrausch and Trischler, *Building Europe on Expertise*; Kaijser and Meyer, "Siting Nuclear Installations at the Border"; Pretel and Camprubi, *Technology and Globalization*; Wang, "The Cold War and the Reshaping of Transnational Science in China." It also distinguishes the chapter by Tiago Saraiva and Amy E. Slaton from others in the collection edited by Pretel and Camprubi: Saraiva and Slaton, "Statistics as Service to Democracy"; So too Turchetti et al., "Introduction: Have We Ever Been 'Transnational?'."
9. This engagement has been stimulated by initiatives like the Max Planck Institute's History of Science ON CALL project and the Consortium for History of Science, Technology and Medicine's 'Perspectives on the Covid-19 Pandemic' initiative. <https://www.mpiwg-berlin.mpg.de/research/projects/history-science-on-call>, <https://www.chstm.org/covid-19>, accessed on 28 July 2020. See also Leonelli's contribution to the MPI's ON CALL project, where she discusses the ambiguities in the process of acquiring data on the number of deaths from Covid 19, <https://www.mpiwg-berlin.mpg.de/video/history-science-call-sabina-leonelli>, accessed 27 July 2020.
10. This case study was inspired by Sharon, "Blind-sided by Privacy?"
11. Statement by Cedric O, "StopCovid: un outil au service de la santé." Unless noted, all texts in French have been translated by JK.
12. Mark Scott, Elisa Braun, Janosch Delcker and Vincent Manancourt, "How Google Outflanked Governments in the Race to Build Coronavirus Apps," *Politico*, 15 May 2020, 10, www.politico.eu/article/google-apple-coronavirus-app-privacy-uk-france-germany/, accessed 25 July 2020.
13. Projet STOPCOVID, Dossier de Presse, Jeudi 23 mai, 2020, "StopCovid, un outil au service de la santé." https://www.economie.gouv.fr/files/StopCovid/DP_Projet_StopCovid.pdf, accessed on 22 July 2020. See also the press release by Inria on 26 April 2020 on "L'équipe-projet StopCovid et l'écosystème des contributeurs se mobilise ...", <https://www.inria.fr/fr/stopcovid>, accessed 25 July 2020.
14. Sportisse, "Contact tracing: an overview of the challenges," www.inria.fr/en/contact-tracing-overview-challenges-bruno-sportisse-inria-ceo, 18 April 2020, accessed 28 July 2020.
15. StopCovid/economie.gouv.fr, accessed 28 July 2020.
16. StopCovid: le projet/economie.gouv.fr, accessed 24 July 2020.
17. Ilves, "Why are Google and Apple Dictating how European Democracies Fight Coronavirus?"
18. Sportisse, "Contact Tracing"; 'StopCovid, un outil au service de la santé.'
19. Stopisse, "Contact Tracing."
20. Ibid.
21. Criddle and Kelion, "Coronavirus Contact Tracing."
22. Ada Lovelace Institute, *Exit through the App Store?*; Allen et al., *Roadmap to Pandemic Resilience*.
23. Ball. "The UK's contact tracing app fiasco."
24. Ibid.
25. Kitchin. "Civil liberties or public health."

26. <https://www.theatlantic.com/international/archive/2018/02/china-surveillance/552203/>
27. “StopCovid, un outil au service de la santé.”
28. Hern, “France Urges Apple and Google,” 2.
29. Srnicek, *Platform Capitalism*; Noble, *Algorithms of Oppression*; Zuboff, *The Age of Surveillance*.
30. Ilves, “Why are Google and Apple Dictating how European Democracies Fight Coronavirus?”, 3.
31. Scott et al., “How Google Outflanked,” 4.
32. Hern, “France Urges Apple and Google,” 2; Scott et al., “How Google Outflanked,” 7.
33. See note 30 above, 3.
34. “StopCovid, un outil au service de la santé.”
35. Commission Supérieure du Numérique et des Postes, *Avis N° 2020-07 du 24 Avril 2020 sur les Conditions de Mise en Oeuvre de l'Application Stop Covid*.
36. Conseil Scientifique, *Sortie Progressif de Confinement*. Prerequis et Mesures Phares, Fiche 6. Implications Ethiques et Strategiques des Options Numeriques, 20 avril 2020, 20h.
37. For this paragraph, see Le Figaro with AFP, “Application de traçage: volte-face de Berlin qui plébiscite Google et Apple,” *Le Figaro*, 26 April 2020.
38. Ibid. Interestingly, problems have since emerged in implementation of the Google Apple proposal in relation to the interpretation of tracing alerts issued by the apps: the level of security is so high that it may pose an obstacle to public health authorities wishing to reassure and assist users (Rory Cellan-Jones, “Is the UK’s NHS COvid-19 App Too Private?”, BBC News, 30 October 2020).
39. Newhouse, *De Gaulle and the Anglo-Saxons*; Nuenlist, *Globalizing de Gaulle*.
40. Contribution by Siegfried Weichlein to “Forum: Surveillance in German History.” Thanks to Mario Daniels for this reference.
41. Unfortunately our sources do not allow us to establish the outcome of negotiations on the interoperability between StopCovid and the Apple/Google app.
42. For reflections on data movement see Leonelli, “Learning from Data Journeys.”
43. Data collected through covid tests are typically garnered through apposite, highly standardized procedures that vary from country to country, but tend to be running in parallel to (and separately from) standard care. We won’t be discussing the efforts to share such data here.
44. Pappas, “Silent hypoxia may be killing COVID-19 patients.”
45. It later became clear that COVID-19 can impact *all* major body systems, including the cardiovascular, nervous and lymphatic ones.
46. Fuller, “Models vs Evidence.”
47. The RDA fosters collaboration among Open Data lobbyists from all disciplines and geographical locations, including a substantive contingent of representatives from government and policy (14 percent of the total membership in July 2020). From the start, its goals were framed as “building the social, organizational and technical infrastructure to reduce barriers to data sharing and exchange, and accelerate the development of coordinated global data infrastructure” (extract from Frank Berman (2014) History of the RDA. Slides presented at the 3rd RDA Plenary meeting in 2014. RDA website).
48. RDA France Webinar, An example regarding the organisation of international cooperation around COVID-19 data. URL: <https://www.rd-alliance.org/rda-france-webinar-activities-and-results-rda-covid-19-working-group-0>
49. RDA website, accessed August 2020 <https://rd-alliance.org/value-rda-covid-19-0>).
50. Maryn McKenna “Covid 19 data in the US is an ‘information catastrophe’,” *Wired* (30 July 2020) <https://www.wired.com/story/covid-19-data-in-the-us-is-an-information-catastrophe/>
51. The advantages of transnational groupings have been widely discussed in Science and Technology Studies, where various forms of organization including networks, consortia and platforms have been explored (for an overview, see Hackett et al., “The Social and Epistemic Organization of Scientific Work”).

52. See Directorate-General for Research and Innovation *Open Innovation, Open Science and Open to the World*. The various initiatives dedicated to Open Science by the European Commission are collected in this site: <https://ec.europa.eu/research/openscience/index.cfm>.
53. French Open Science Plan (2018) <https://libereurope.eu/blog/2018/07/05/frenchopenscienceplan/>
54. Mariana Mazzucato, "Preventing Digital Feudalism," *Project Syndicate*, 2 October 2019, <https://www.project-syndicate.org/commentary/platform-economy-digital-feudalism-by-mariana-mazzucato-2019-10>, accessed on 14 August 2020.
55. Hughes, "Whigs, Prigs and Politics," 25.
56. Ibid., 25.
57. Adelman, "What is Global History Now?" 2.
58. Zuboff, *The Age of Surveillance Capitalism*; Noble, *Algorithms of Oppression*; Eubanks, *Automating Inequality*. Another substantive line of sociological and historical investigation into the intersection of digital data collection with national sovereignty concerns attempts to nationalize genomics in Mexico, Iceland and elsewhere, as documented for instance by Fortun *Promising Genomics*; and Kent et al., "Building the Genomic Nation."
59. Bowker and Star, *Sorting Things Out*; Timmermans and Epstein "A World of Standards but not a Standard World."
60. The idea of cosmopolitan commons, and related conceptions of commons in the contemporary scholarship, is masterfully discussed in Disco and Kranakis, *Cosmopolitan Commons*.
61. Hewson, "Did Global Governance Create Informational Globalism?"; Edwards, *A Vast Machine*; Anorova et al., "Big Science and Big Data in Biology"; Leonelli "Data: from Objects to Assets."
62. Nature editorial. "Systemic Racism: Science must Listen, Learn And Change."
63. Santos, *The End of the Cognitive Empire*.

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